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EDGAR SPIELMAN
ALBEMARLE CORPORATION
451 FLORIDA BLVD.
BATON ROUGE, LA 70801

EXAMINER

OH, TAYLOR V

ART UNIT	PAPER NUMBER
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1625

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/788,850	Applicant(s) GATTO ET AL.	
	Examiner Taylor Victor Oh	Art Unit 1625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 and 69 is/are pending in the application.
- 4a) Of the above claim(s) 50-68 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-49, 69 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Applicant's arguments with respect to claims 1-49 and 69 have been considered but are moot in view of the new ground(s) of rejection.

The Status of Claims :

Claims 1- 69 are pending.

Claims 1-49 and 69 are rejected.

Claims 50-68 are withdrawn from consideration.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-4, and 7-37 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for potassium hydroxide, sodium hydroxide, lithium hydroxide, cesium hydroxide, calcium hydroxide and magnesium hydroxide, alkali metal hydrides, alkali metal alkoxides, alkali metal amides, dibutyl tin oxide, zinc salts, calcium salts, monoalkyl tins, alkali metal hydrocarbyloxides as either a first or a second catalyst does not reasonably provide enablement for all kinds of the first and the second catalyst known in the art. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to include all

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kinds of the first and the second catalyst unrelated to the claimed invention commensurate in scope with these claims.

Furthermore, the instant specification fails to provide information that would allow the skilled artisan to practice the instant invention without **undue experimentation**.

Attention is directed to *In re Wands*, 8 USPQ2d 1400 (CAFC 1988) at 1404 where the court set forth the eight factors to consider when assessing if a disclosure would have required undue experimentation, citing *Ex Parte Forman*, 230 USPQ 546 (BdApls 1986) at 547 the court recited eight factors:

- 1) the quantity of experimentation necessary,
- 2) the amount of direction or guidance provided,
- 3) the presence or absence of working examples,
- 4) the nature of the invention,
- 5) the state of the prior art,
- 6) the relative skill of those in the art,
- 7) the predictability of the art, and
- 8) the breath of the claims.

The Nature of the Invention

The nature of the invention in Claims 1-4, and 7-37 is following:

Claim 1. (previously presented): A method for the production of a hindered phenolic alkyl ester compound comprising:

- a) reacting methyl acrylate with an alkylphenol compound in the presence of a first catalyst to form a methyl ester intermediate compound,
- b) reacting an alcohol having at least 2 carbon atoms with the methyl ester intermediate compound in the presence of a second catalyst to form the hindered phenolic alkyl ester compound,
- c) neutralizing any catalyst residue with an aqueous phosphoric acid to form a precipitated phosphate salt, and
- d) separating the precipitated phosphate salt from the hindered phenolic alkyl ester compound.

The State of the Prior Art

The states of the prior art are described as followed:

[00015] For example, U.S. Patent No. 4,085,132 to Park, *et al.* describes a one-step method of producing higher molecular weight hindered phenolic esters. According to this method, methyl acrylate is gradually added to a reaction mixture comprising 2,6-di-tert-butylphenol (which is a higher molecular weight monohydric hindered phenol), a high molecular weight alcohol, and a catalyst, without isolating the intermediate in a separate step. Higher excesses of methyl acrylate are required in order to drive this type of reaction to completion. The catalysts employed are alkaline metal catalysts of lithium, sodium and potassium. Catalyst neutralization is performed with acetic acid, which may not be effective for a water wash-free product isolation. The hindered phenol ester product is isolated as a solid by crystallization or recrystallization from the neutralized reaction mixture.

[00018] Another example of a one-step reaction is set forth in U.S. Patent No. 3,840,585 to Yamada, *et al.*, wherein an alkyl acrylate is reacted with an alkylphenol to produce the final product. The patent describes the use of complex metal hydrides as catalysts. Such complex metal hydrides are very difficult to handle and to remove from the product but the process attempts to remove them by using acetic acid for neutralization. The reaction requires a promoter that is removed from the finished product by diluting the product with large volumes of toluene and then subsequently washing with water.

[00023] Finally, U.S. Patent No. 6,559,105 to Abraham, *et al.*, describes a Michael reaction that uses large amounts of magnesium silicate as an absorbent and filter aid to neutralize the potassium hydroxide catalyst. This process creates waste disposal issues due to the large volume of solids that are generated. For example, approximately 2.70% solids based on the weight of total phenolic ester product are produced.

As the prior art have been discussed in the above, there is no conclusive data that all the kinds of the first and the second catalyst used in the process would work to produce the final desired product since there were only few examples such as alkaline metal catalyst and alkaline metal hydrides useful for the process .

The predictability or lack thereof in the art

In the instant case, the instant claimed invention is highly unpredictable since one skilled in the art would recognize that not every first and second catalyst would

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work on the claimed process in the same way as do those catalysts such as potassium hydroxide, sodium hydroxide, lithium hydroxide, cesium hydroxide, calcium hydroxide and magnesium hydroxide, alkali metal hydrides, alkali metal alkoxides, alkali metal amides, dibutyl tin oxide, zinc salts, calcium salts, monoalkyl tins, alkali metal hydrocarbyloxides disclosed in the specification.

According to T.P.Hilditch, the author of the "Catalytic Processes in Applied Chemistry" (see pages Xiii-XV, 1929), there is a definitive reason for an unpredictable aspect of the catalysts in the art of organic chemistry. T.P.Hilditch expressly teaches that any catalyst would not work for any kind of the reaction process; for example, the specific catalysts such as mineral acids, acetic anhydride, sulfuric acid, calcium chloride, and etc can be used for the esterification; on the other hand, this same kind of catalyst will not apply to the other types of the reaction process in the followings: the chlorination of organic compounds, the oxidation of organic compounds, the process for rubber accelerators, the hydrogenation or the dehydrogenation processes, ammonia synthesis, ammonia oxidation, sulfuric acid manufacture, and etc. (see pages Xiii-XV).

Furthermore, the specification of the claimed invention does support the very idea of the unpredictable aspect of the catalysts by disclosing the following specific, workable catalyst for the production of a hindered phenolic alkyl ester, not all kinds of the catalyst known in the art.

Moreover, chemical reactions are well-known to be unpredictable, *In re Marzocchi*, 169 USPQ 367, *In re Fisher*, 166 USPQ 18. Additionally, catalytic

processes, such as are present here, are inherently unpredictable. The U.S. District Court District of Connecticut held in *MOBIL OIL CORPORATION v. W.R. GRACE & COMPANY*, 180 USPQ 418 that "there is an inherent mystery surrounding the unpredictability of the performance of catalysts; a mystery which is generally recognized and acknowledged by chemists in the cracking art. This is one more reason why the presumption of patent validity "should not be disregarded especially in a case of this sort where the intricate questions of [bio]chemistry involved are peculiarly within the particular competence of the experts of the Patent Office." *Merck & Co. v. Olin Mathieson Chemical Corp.*, 253 F.2d 156, 164, 116 USPQ 484, 490 (4th Cir. 1958)". "The catalytic action can not be forecast by its chemical composition, for such action is not understood and is not known except by actual test, *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358, 368-369 (1928). Also see, *Application of Grant*, 304 F.2d 676, 679, 134 USPQ 248, 250-251 (CCPA 1962); *Rich Products Corp. v. Mitchell Foods, Inc.*, 357 F.2d 176, 181, 148 USPQ 522, 525-526 (2d Cir. 1966), cert. denied 385 U.S. 821, 151 USPQ 757 (1966); *Ling-Temco-Vought, Inc. v. Kollsman Instrument Corp.*, 372 F.2d 263, 268, 152 USPQ 446, 450-451 (2d Cir. 1967); *Georgia-Pacific Corp. v. United States Plywood Corp.*, 258 F.2d 124, 132-133, 118 USPQ 122, 128-129."

Therefore, from the above, it is clear that the use of every generic "a first catalyst" and "a second catalyst" will not form the desired claimed product in a good yield.

The amount of direction or guidance present

The direction present in the instant specification is that not any catalyst can be led to the formation of the desired product. According to the specification, it is silent as to how any first catalyst and any second catalyst can be led to the formation of the desired product and fails to provide guidance as to whether any catalyst is sufficient enough to allow to form the desired product in sufficient quantities; the specification fails to provide a correlation between the claimed process of the invention and the functional language of any first and second catalyst.

The presence or absence of working examples

There are only 7 working example using only KOH and t-BUOK catalyst for producing the desired compound in the specification. This can not be the representatives for all the catalysts which would work for the claimed process. Thus, the specification fails to provide enough working examples as to how the other types of metal catalysts can be resulted in the claimed products, i.e. again, there is no correlation between the functional language of any first and second catalyst and the desired final product.

The breadth of the claims

The breadth of the claims is that any first and second catalyst would work on the claimed process in the same way as the disclosed catalyst without considering the affect or impact of the different catalysts on the starting compound, thereby affecting the yield of the desired final product.

The quantity of experimentation needed

The quantity of experimentation needed is large. One of skill in the art would need to determine which one of the metal catalysts would be capable of forming the desired product and would furthermore then have to determine which one of the first and second catalysts would not be resulted in the claimed desired compounds in a sufficient quantity.

The level of the skill in the art

Even though the level of skill in the art of Michael Reaction and transesterification reaction is high, the skilled artisan employing this process would be a BS Chemist working in a laboratory facility. He would know how to use the taught catalyst, but not how to select other catalyst without trial and error.

Therefore, in view of the Wands factors and *In re Fisher* (CCPA 1970) discussed above, to practice the claimed invention herein, a person of skill in the art would have to engage in undue experimentation to test which the first and the second catalyst can be employed to produce the desired claimed compound encompassed in the instant claims, with no assurance of success.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

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art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 38-49 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for potassium hydroxide, sodium hydroxide, lithium hydroxide, cesium hydroxide, calcium hydroxide and magnesium hydroxide, alkali metal hydrides, alkali metal alkoxides, alkali metal amides, dibutyl tin oxide, zinc salts, calcium salts, monalkyl tins, alkali metal hydrocarboxides as a catalyst does not reasonably provide enablement for all kinds of the catalysts known in the art. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to include all kinds of the catalysts unrelated to the claimed invention commensurate in scope with these claims.

Furthermore, the instant specification fails to provide information that would allow the skilled artisan to practice the instant invention without undue experimentation. Attention is directed to *In re Wands*, 8 USPQ2d 1400 (CAFC 1988) at 1404 where the court set forth the eight factors to consider when assessing if a disclosure would have required undue experimentation, citing *Ex Parte Forman*, 230 USPQ 546 (BdApl 1986) at 547 the court recited eight factors:

- 1) the quantity of experimentation necessary,
- 2) the amount of direction or guidance provided,
- 3) the presence or absence of working examples,
- 4) the nature of the invention,

- 5) the state of the prior art,
- 6) the relative skill of those in the art,
- 7) the predictability of the art, and
- 8) the breadth of the claims.

The Nature of the Invention

The nature of the invention in Claim 38 is following:

Claim 38. (currently amended): A method for the production of a hindered phenolic alkyl ester compound comprising:

- a) reacting an alkyl acrylate with an alkylphenol compound in the presence of a catalyst to form the hindered phenolic alkyl ester compound,
- b) neutralizing the catalyst with an aqueous acid to form a precipitated salt, wherein the aqueous acid comprises at least one compound selected from the group consisting of sulfuric acid, phosphoric acid, and mixtures thereof, and
- c) separating the precipitated salt from the hindered phenolic alkyl ester compound by filtration.

The State of the Prior Art

The states of the prior art are described as followed:

[00015] For example, U.S. Patent No. 4,085,132 to Park, *et al.* describes a one-step method of producing higher molecular weight hindered phenolic esters. According to this method, methyl acrylate is gradually added to a reaction mixture comprising 2,6-di-tert-butylphenol (which is a higher molecular weight monohydric hindered phenol), a high molecular weight alcohol, and a catalyst, without isolating the intermediate in a separate step. Higher excesses of methyl acrylate are required in order to drive this type of reaction to completion. The catalysts employed are alkaline metal catalysts of lithium, sodium and potassium. Catalyst neutralization is performed with acetic acid, which may not be effective for a water wash-free product isolation. The hindered phenol ester product is isolated as a solid by crystallization or recrystallization from the neutralized reaction mixture.

[00018] Another example of a one-step reaction is set forth in U.S. Patent No. 3,840,585 to Yamada, *et al.*, wherein an alkyl acrylate is reacted with an alkylphenol to produce the final product. The patent describes the use of complex metal hydrides as catalysts. Such complex metal hydrides are very difficult to handle and to remove from the product but the process attempts to remove them by using acetic acid for neutralization. The reaction requires a promoter that is removed from the finished product by diluting the product with large volumes of toluene and then subsequently washing with water.

[00023] Finally, U.S. Patent No. 6,559,105 to Abraham, *et al.*, describes a Michael reaction that uses large amounts of magnesium silicate as an absorbent and filter aid to neutralize the potassium hydroxide catalyst. This process creates waste disposal issues due to the large volume of solids that are generated. For example, approximately 2.70% solids based on the weight of total phenolic ester product are produced.

As the prior art have been discussed in the above, there is no conclusive data that all the kinds of the catalyst used in the process would work to produce the final desired product since there were only few examples such as alkaline metal catalyst and alkaline metal hydrides useful for the process .

The predictability or lack thereof in the art

In the instant case, the instant claimed invention is highly unpredictable since one skilled in the art would recognize that not every catalyst would work on the claimed process in the same way as do those catalysts such as potassium hydroxide, sodium hydroxide, lithium hydroxide, cesium hydroxide, calcium hydroxide and magnesium hydroxide, alkali metal hydrides, alkali metal alkoxides, alkali metal amides, dibutyl tin oxide, zinc salts, calcium salts, monoalkyl tins, alkali metal hydrocarboxides disclosed in the specification.

According to T.P.Hilditch, the author of the "Catalytic Processes in Applied Chemistry" (see pages Xiii-XV, 1929), there is a definitive reason for an unpredictable aspect of the catalysts in the art of organic chemistry. T.P.Hilditch expressly teaches

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that any catalyst would not work for any kind of the reaction process; for example, the specific catalysts such as mineral acids, acetic anhydride, sulfuric acid, calcium chloride, and etc can be used for the esterification; on the other hand, this same kind of catalyst will not apply to the other types of the reaction process in the followings: the chlorination of organic compounds, the oxidation of organic compounds, the process for rubber accelerators, the hydrogenation or the dehydrogenation processes, ammonia synthesis, ammonia oxidation, sulfuric acid manufacture, and etc. (see pages Xiii-XV).

Furthermore, the specification of the claimed invention does support the very idea of the unpredictable aspect of the catalysts by disclosing the following specific, workable catalyst for the production of a hindered phenolic alkyl ester, not all kinds of the catalyst known in the art.

Moreover, chemical reactions are well-known to be unpredictable, *In re Marzocchi*, 169 USPQ 367, *In re Fisher*, 166 USPQ 18. Additionally, catalytic processes, such as are present here, are inherently unpredictable. The U.S. District Court District of Connecticut held in *MOBIL OIL CORPORATION v. W.R. GRACE & COMPANY*, 180 USPQ 418 that "there is an inherent mystery surrounding the unpredictability of the performance of catalysts; a mystery which is generally recognized and acknowledged by chemists in the cracking art. This is one more reason why the presumption of patent validity "should not be disregarded especially in a case of this sort where the intricate questions of [bio]chemistry involved are peculiarly within the particular competence of the experts of the Patent Office." *Merck & Co. v. Olin*

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Mathieson Chemical Corp., 253 F.2d 156, 164, 116 USPQ 484, 490 (4th Cir. 1958)".

"The catalytic action can not be forecast by its chemical composition, for such action is not understood and is not known except by actual test, *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358, 368-369 (1928). Also see, *Application of Grant*, 304 F.2d 676, 679, 134 USPQ 248, 250-251 (CCPA 1962); *Rich Products Corp. v. Mitchell Foods, Inc.*, 357 F.2d 176, 181, 148 USPQ 522, 525-526 (2d Cir. 1966), cert. denied 385 U.S. 821, 151 USPQ 757 (1966); *Ling-Temco-Vought, Inc. v. Kollsman Instrument Corp.*, 372 F.2d 263, 268, 152 USPQ 446, 450-451 (2d Cir. 1967); *Georgia-Pacific Corp. v. United States Plywood Corp.*, 258 F.2d 124, 132-133, 118 USPQ 122, 128-129."

Therefore, from the above, it is clear that the use of every generic "a catalyst" will not form the desired claimed product in a good yield.

The amount of direction or guidance present

The direction present in the instant specification is that not any catalyst can be led to the formation of the desired product. According to the specification, it is silent as to how any catalyst can be led to the formation of the desired product and fails to provide guidance as to whether any catalyst is sufficient enough to allow to form the desired product in sufficient quantities; the specification fails to provide a correlation between the claimed process of the invention and the functional language of any catalyst.

The presence or absence of working examples

There are only 7 working example using only KOH and t-BUOK catalyst for producing the desired compound in the specification. This can not be the representatives for all the catalysts which would work for the claimed process. Thus, the specification fails to provide enough working examples as to how the other types of metal catalysts can be resulted in the claimed products, i.e. again, there is no correlation between the functional language of any catalyst and the desired final product.

The breadth of the claims

The breadth of the claims is that any catalyst would work on the claimed process in the same way as the disclosed catalyst without considering the affect or impact of the different catalysts on the starting compound, thereby affecting the yield of the desired final product.

The quantity of experimentation needed

The quantity of experimentation needed is large. One of skill in the art would need to determine which one of the metal catalysts would be capable of forming the desired product and would furthermore then have to determine which one of the catalysts would not be resulted in the claimed desired compounds in a sufficient quantity.

The level of the skill in the art

Even though the level of skill in the art of Michael Reaction and transesterification reaction is high, the skilled artisan employing this process would be

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a BS Chemist working in a laboratory facility. He would know how to use the taught catalyst, but not how to select other catalyst without trial and error.

Therefore, in view of the Wands factors and *In re Fisher* (CCPA 1970) discussed above, to practice the claimed invention herein, a person of skill in the art would have to engage in undue experimentation to test which catalyst can be employed to produce the desired claimed compound encompassed in the instant claims, with no assurance of success.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4, 7-37 and 43-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, 23, 28, 31-32, and 36, the terms " a first catalyst " and " a second catalyst " are recited. The expression of the terms are vague and indefinite because the claim does not elaborate which one is the first catalyst or the second catalyst in

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the claimed process ; furthermore, there is no distinction between them as to their differences. Therefore, an appropriate correction is required.

In claims 21, 33-34 ,49, the term “ comprises” is recited. The expression of the term is vague and indefinite because the expression of the term would mean that there are some unknown additional components besides the promoter or the aqueous acid. That term should be used to describe the mixture instead of the definitive compound . Therefore, the examiner recommends to change from“ comprises ” to “is ” or “ is selected from ”. Therefore, appropriate correction is required

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

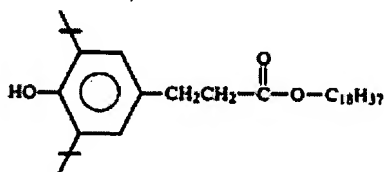
Claims 1-49 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haeberli et al (U.S. 4,228,297) in view of Grant et al (Chemical Dictionary, 1990, p. 11-12).

Haeberli et al discloses a process of producing hydroxyalkylphenyl derivative by adding methyl acrylate in the presence of an alkaline catalyst to the alkyl substituted phenolic compound, and adding to the resultant reaction mixture a suitable alcohol in the presence of a second catalyst and further its process has been exemplified as below (see col. 10 ,lines 29-62):

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- To a 500 ml, 3-necked flask, equipped with a stirrer, a reflux condenser, a calibrated dropping funnel, a thermometer and a nitrogen inlet were charged 103 g of 2,6-di-t-butylphenol. The phenol was heated to 70° C., and the system was purged carefully with nitrogen. Then 1.4 g of potassium t-butoxide were added, followed by 2 ml of isopropyl alcohol. The resultant mixture was heated to 107° C. to 110° C., whereupon 47.3 g of methyl acrylate were added at a uniform rate over a two hour period while maintaining the specified temperature range. The mixture was held for three hours at the specified temperature range. Then vacuum was applied to strip excess methyl acrylate. The vacuum was released with nitrogen, the mixture was cooled to 70° C. and 24.4 g of thiodiglycol were added, followed by 0.47 g of lithium hydroxide monohydrate. Vacuum was applied and the pressure was reduced to 20 mm Hg. The reaction mixture was then gradually heated to 140° to 145° C. in two hours and held at that temperature for three hours. The vacuum was then released with nitrogen, and the reaction mass was cooled to 70° C. and acidified with 3.0 g of glacial acetic acid. 132 g of ethyl alcohol were added to the melt, and the resultant solution was clarified. The filtrate was cooled to 28° C. and seeded with 0.5 g of thio-bis-(ethylene-3-(3,5-di-t-butyl-4-hydroxyphenyl)propionate).
- The reaction product crystallized and the resulting slurry was cooled to 16° C. The product was isolated on a Buchner funnel, washed with cold ethyl alcohol, sucked dry and dried in a vacuum oven at 50° C. to a constant weight. 97.0 g of dry thio-bis-(ethylene-3-(3,5-di-t-butyl-4-hydroxyphenyl)propionate) were obtained; m.p. 71.5° C.; yield 75.4%, based on the thiodiglycol employed.

EXAMPLE 3



The procedure described in Example 1 was followed using, however, 126 g of n-octadecyl alcohol in place of thiodiglycol and crystallizing the reaction product from 750 g of 90% isopropyl alcohol. 218 g of dry n-octadecyl-β-(3,5-di-t-butyl-4-hydroxyphenyl)propionate were obtained; m.p. 53.0° C.; yield 87% based on the n-octadecyl alcohol employed.

(see col. 11, example 3, lines 20-31).

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The second alkaline catalyst may be selected from the classes of compounds listed above for the first alkaline catalyst, i.e., alkali metal hydrides, alkali metal alkoxides of Formula VI or alkali metal amides of Formula VII. In addition, alkali metal hydroxides may be employed, such as lithium hydroxide. Preferred second alkaline catalysts are lithium amide and lithium hydroxide.

(see col. 9, lines 1-8).

Furthermore, the overall molar ratio of methyl acrylate and the phenol compound should be at least 1:1, preferably a slightly excess of about 5 to 30 moles percent of methyl acrylate is used (see col. 8, lines 43-47).

However, the instant invention differs from the Haeberli et al in that the claimed process uses the phosphoric acid in the neutralization step instead of acetic acid; the precipitated phosphate salt is unspecified.

Regarding the precipitated salt, the formation of the prior art expressly discloses the following passages (see col. 10, lines 47-52):

three hours. The vacuum was then released with nitrogen, and the reaction mass was cooled to 70° C. and acidified with 3.0 g of glacial acetic acid. 132 g of ethyl alcohol were added to the melt, and the resultant solution was clarified. The filtrate was cooled to 28° C. and

From this passage, it shows that, after the reaction mixture being acidified with acetic acid, the terms "the filtrate" is employed to describe the clear liquid that passed through a filter; this means that the precipitated salt of the catalyst can be removed by the filter; in other words, during the neutralization process in the prior art, it implies

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that glacial acetic acid does form a precipitated salt just like the claimed process.

Therefore, the prior art process is still relevant to the claimed invention.

With respect to the use of the phosphoric acid in the claimed process, the prior art is silent. However, with respect to the role of the acid in the neutralization step, the acetic acid has the same function as the phosphoric acid in the claimed process; regardless of the type of the acid to be used, the only role of the acid is to neutralize the base in the process. Furthermore, the phosphoric acid is one of the well-known acids in the art as shown in Grant et al (Chemical Dictionary, 1990, p. 11-12).

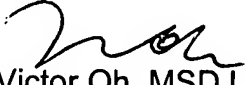
Therefore, it would have been obvious to the skilled artisan in the art to be motivated to use the phosphoric acid as an alternative to acetic acid for the neutralization step in the prior art process. This is because the skilled artisan in the art would expect such a modification to be feasible and successful as shown in the prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Taylor Victor Oh whose telephone number is 571-272-0689. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas McKenzie can be reached on 571-272-0670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Taylor Victor Oh, MSD, LAC
Primary Examiner
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5/28/07